

Amendments to the Claims

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims

Claims 1-14. (Cancelled)

15. (Currently amended) Method for controlled release of macromolecules from a multi-layer film, comprising the steps of:

(a) selecting a polymer that can be modulated between an electrostatically charged state and an electrostatically uncharged state;

(b) selecting a macromolecule that bonds electrostatically to the polymer in its electrostatically charged state;

(c) forming a multi-layer film having sequential alternating layers of the polymer and the macromolecule at a first pH at which the multi-layer film has a charge balance having a value of approximately one, said alternating layers being bonded one to another at least through electrostatic interactions; and

(d) adjusting the pH of the multi-layer film so as to create a first excess charge of the multi-layer film without destroying said multi-layer film, thereby selectively releasing a controlled first quantity of the macromolecule from the multi-layer film so as to restore the value of the charge balance to a value of approximately one, said first quantity of the macromolecule being substantially proportional to said first excess charge.

16. (Currently amended) The method of Claim 15, further comprising the steps of: (e) adjusting the pH of the multi-layer film so as to create a second excess

charge of the multi-layer film having a sign opposite to the sign of the first excess charge of the multi-layer film without destroying said multi-layer film; and (f) contacting the multi-layer film with a solution of containing the macromolecule, whereby the multi-layer film takes up a second quantity of the macromolecule.

17. (Withdrawn)

18. (Previously presented) The method of Claim 16, wherein steps (d), (e) and (f) are performed in a sequence, further comprising the step of repeating steps (d), (e) and (f) in said sequence.

19. (Withdrawn)

20. (Previously presented) The method of Claim 15, wherein the macromolecule is a bioactive agent.

21. (New) The method of Claim 15, wherein the alternating layers are bonded one to another through a combination of electrostatic interaction and hydrogen bonding.

22. (New) The method of Claim 15, wherein the polymer is a polyacid.

23. (New) The method of Claim 22, wherein the polyacid is selected from the group consisting of a polycarboxylic acid, a polynucleotide, a polymer of a vinyl nucleic acid, and a polyamino acid.

24. (New) The method of Claim 23, wherein the macromolecule is a macromolecule that can self-assemble with the polyacid.

25. (New) The method of Claim 15, wherein the polymer is a polybase.

26. (New) The method of Claim 25, wherein the polybase is selected from the group consisting of a partially quaternized poly(vinyl pyridine), a poly(imidazole), a polyamine, a quaternized poly(vinyl pyridine), a quaternized poly(imidazole), a poly(dimethyldiallyl) salt, a quaternized poly(diaminoethoxy acrylate), and a poly(diaminoethoxy acrylate).

27. (New) The method of Claim 25, wherein the macromolecule is a macromolecule that can self-assemble with the polybase.

28. (New) The method of Claim 15, wherein said step (c) includes the steps of forming a layer of the polymer by self-assembly of the polymer, then forming a layer of the macromolecule by self-assembly of the macromolecule on the layer of the polymer.

29. (New) The method of Claim 15, wherein the multi-layer film includes a layer of the polymer having the macromolecule embedded in the layer.

30. (New) The method of Claim 15, wherein the macromolecule is a polymer.

31. (New) The method of Claim 15, wherein the macromolecule is a oligomer.